# 1000W Switching Power Supply for Harsh Environment HEP-1000 series

IP67 (Optional) UL62368-1 EN62368-1 TPTC004 IEC62368-1

Household Automate Industrial Security Network Telecom

## Features

- Built-in active PFC function
- High efficiency up to 96%
- Fanless design, cooling by free air convection
- Aluminum case and filling with heat-conducted glue
- Withstand 10G vibration test
- -40 ~ +70℃ wide operating range
- Charger for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese)
- Built-in default 2/3 stage charging curves and programmable curve
- Built-in PMBus protocol / Optional CANBus protocol
- Output voltage and constant current level programmable
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in remote ON-OFF control
- DC OK active signal
- LED indicator for power on
- Optional wiring type with IP67 rating
- 6 years warranty

## Certificates

- Safety: UL/EN62368-1
- EMC: EN 55032 / 55024

## Applications

- Industrial automation machinery
- Industrial control system
- Mechanical and electrical equipment
- Electronic instruments, equipments or apparatus
- Household appliances

## Description

HEP-1000 is a 1000W industrial AC/DC power supply featuring the outstanding capability to operate under highly humid, dusty, oily, and high-vibration harsh environment. The entire series is housed with the aluminum case and fully potted with heat-conducted silicone.Adopting the full range 90~305VAC input, the entire series provides an output voltage line of 24V, 48V and 100V. In addition to the high efficiency up to 96%, that the whole series operates from -40℃ ~ 70℃ under air convection without fan. HEP-1000 has the complete protection functions and 10G anti-vibration capability ; It is complied with the international safety regulations such as TUV EN62368-1 UL62368-1, and the design refers to EN61558-1 and EN60335-1 HEP-1000 series serves as a high performance power supply solution for various industrial applications.

## Model Encoding

HEP -1000 - 24 □

- □ — Communication protocol option
- 24 — Output voltage
- 1000 — Rated wattage
- HEP — Series name

| Type | Communication Protocol | Note |
|---|---|---|
| Blank | PMBus protocol | In Stock |
| CAN | CANBus protocol | By request |

## SPECIFICATION FOR POWER SUPPLY

| MODEL | | HEP-1000-24 | HEP-1000-48 | HEP-1000-100 |
|---|---|---|---|---|
| OUTPUT | DC VOLTAGE | 24V | 48V | 100V |
| | RATED CURRENT | 42A | 21A | 10A |
| | RATED POWER | 1008W | 1008W | 1000W |
| | RIPPLE & NOISE (max.) Note.2 | 200mVp-p | 250mVp-p | 500mVp-p |
| | VOLTAGE ADJ. RANGE | By built-in potentiometer, SVR | | |
| | | 24 ~ 30V | 48 ~ 60V | 100 ~ 125V |
| | VOLTAGE TOLERANCE Note.3 | ±1.0% | ±1.0% | ±1.0% |
| | LINE REGULATION | ±0.5% | ±0.5% | ±0.5% |
| | LOAD REGULATION | ±0.5% | ±0.5% | ±0.5% |
| | SETUP, RISE TIME | 1800ms, 80ms at full load 230VAC /115VAC | | |
| | HOLD UP TIME (Typ.) | 16ms / 230VAC at 75% load 12ms / 230VAC at full load | | |
| INPUT | VOLTAGE RANGE Note.4 | 90 ~ 305VAC 250 ~ 431VDC | | |
| | FREQUENCY RANGE | 47 ~ 63Hz | | |
| | POWER FACTOR (Typ.) | PF>0.99/115VAC, PF>0.95/230VAC, PF>0.93/277VAC at full load | | |
| | EFFICIENCY (Typ.) | 95% | 96% | 96% |
| | AC CURRENT (Typ.) | 10.1A / 115VAC 5.3A / 230VAC 4.5A / 277VAC | | |
| | INRUSH CURRENT(Typ.) | Cold start 40A at 230VAC | | |
| | LEAKAGE CURRENT | <0.75mA / 240VAC | | |
| PROTECTION | OVERLOAD | 105~125% rated output power | | |
| | | Protection type : Constant current limiting, unit will shutdown after 5 sec, re-power on to recover. | | |
| | SHORT CIRCUIT | Constant current limiting, unit will shutdown after 5 sec, re-power on to recover. | | |
| | OVER VOLTAGE | 30 ~ 35V | 60 ~ 70V | 125 ~ 145V |
| | | Protection type :Shut down O/P voltage,re-power on to recover | | |
| | OVER TEMPERATURE | Protection type :Shut down O/P voltage, recovers automatically after temperature goes down | | |
| FUNCTION | OUTPUT VOLTAGE PROGRAMMABLE(PV) Note 5 | Adjustment of output voltage is allowable to 50 ~ 125% of nominal output voltage<br>Please refer to the Function Manual. | | |
| | OUTPUT CURRENT PROGRAMMABLE(PC) Note 5 | Adjustment of constant current level is allowable to 20 ~ 100% of rated current.<br>Please refer to the Function Manual. | | |
| | REMOTE ON/OFF CONTROL | Power ON : Short circuit Power OFF : Open circuit | | |
| | AUXILIARY POWER | 12V @ 0.5A tolerance ±10%, ripple=150mVp-p | | |
| | DC-OK SIGNAL | The TTL signal out, PSU turn on = 4.4 ~ 5.5V ; PSU turn off = -0.5 ~ 0.5V. Please refer to the Function Manual. | | |
| ENVIRONMENT | WORKING TEMP. | -40 ~ +70℃ (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20 ~ 95% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -40 ~ +80℃, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | ±0.03%/℃ (0 ~ 50℃) | | |
| | VIBRATION | 20 ~ 500Hz, 10G 12min./1cycle, period for 72min. each along X, Y, Z axes | | |
| SAFETY & EMC (Note.6) | SAFETY STANDARDS | UL62368-1,TUV EN62368-1, EAC TP TC 004 approved; design refer to EN61558-1, EN60335-1(by request) | | |
| | WITHSTAND VOLTAGE | I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.25KVAC | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG,O/P-FG:100M Ohms/500VDC/25℃/ 70%RH | | |
| | EMC EMISSION | **Parameter** | **Standard** | **Test Level / Note** |
| | | Conducted | EN55032 (CISPR32) | Class B |
| | | Radiated | EN55032 (CISPR32) | Class B |
| | | Harmonic Current | EN61000-3-2 | Class A |
| | | Voltage Flicker | EN61000-3-3 | ----- |
| | EMC IMMUNITY | EN55024 , EN61000-6-2 | | |
| | | **Parameter** | **Standard** | **Test Level / Note** |
| | | ESD | EN61000-4-2 | Level 3, 8KV air ; Level 2, 4KV contact |
| | | Radiated | EN61000-4-3 | Level 3 |
| | | EFT / Burst | EN61000-4-4 | Level 3 |
| | | Surge | EN61000-6-2 | 2KV/Line-Line 4KV/Line-Earth |
| | | Conducted | EN61000-4-6 | Level 3 |
| | | Magnetic Field | EN61000-4-8 | Level 4 |
| | | Voltage Dips and Interruptions | EN61000-4-11 | >95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods |
| OTHERS | MTBF | 197.9K hrs min. Telcordia SR-332 (Bellcore) ; 52.32K hrs min. MIL-HDBK-217F (25℃) | | |
| | DIMENSION | 310*144*48.5mm (L*W*H) | | |
| | PACKING | 4Kg;4pcs/17Kg/1.04CUFT | | |

**NOTE**

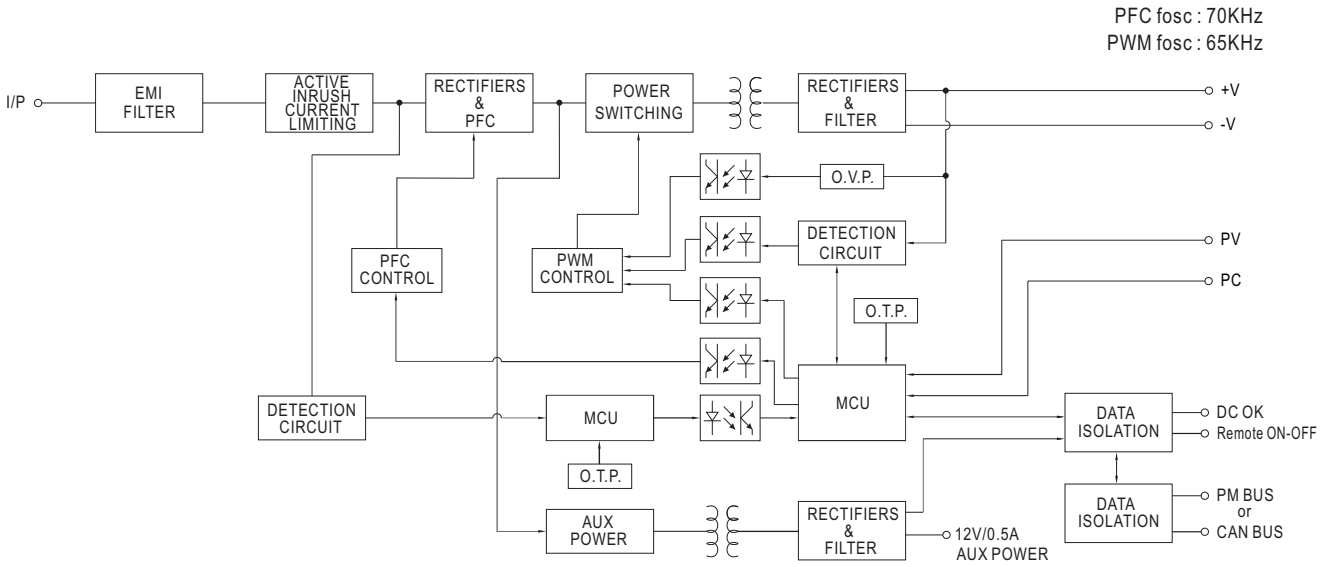
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance :includes set up tolerance, line regulation and load regulation.
4. Derating may be needed under low input voltages. Please check the derating curve for more details.
5. PV/PC functions when users do not use SVR.
6. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 720mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on http://www.meanwell.com)
7. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft).

※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx

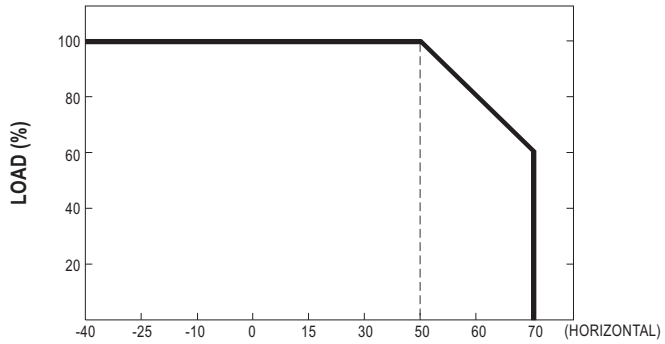
## SPECIFICATION FOR CHARGER

| MODEL | | HEP-1000-24 | HEP-1000-48 | HEP-1000-100 |
|---|---|---|---|---|
| OUTPUT | BOOST CHARGE VOLTAGE Vboost | 28.8V | 57.6V | 115.2V |
| | FLOAT CHARGE VOLTAGE Vfloat | 27.6V | 55.2V | 110.4V |
| | RECOMMENDED BATTERY CAPACITY(AMP HOURS)(Note 2) | 120 ~ 350AH | 60 ~ 175AH | 30 ~ 85AH |
| | BATTERY TYPE | Open & Sealed Lead Acid | | |
| | OUTPUT CURRENT | 35A | 17.5A | 8.7A |
| INPUT | VOLTAGE RANGE Note 3 | 90 ~ 305VAC 250 ~ 431VDC | | |
| | FREQUENCY RANGE | 47 ~ 63Hz | | |
| | POWER FACTOR (Typ.) | PF>0.99/115VAC, PF>0.95/230VAC, PF>0.93/277VAC at full load | | |
| | EFFICIENCY (Typ.) | 95% | 96% | 96% |
| | AC CURRENT (Typ.) | 10.1A / 115VAC 5.3A / 230VAC 4.5A / 277VAC | | |
| | INRUSH CURRENT(Typ.) | Cold start 40A at 230VAC | | |
| | LEAKAGE CURRENT | <0.75mA / 240VAC | | |
| PROTECTION | SHORT CIRCUIT | Constant current limiting, unit will shutdown after 5 sec, re-power on to recover. | | |
| | OVER VOLTAGE | 30 ~ 35V | 60 ~ 70V | 125 ~ 145V |
| | | Protection type :Shut down O/P voltage,re-power on to recover | | |
| | OVER TEMPERATURE | Protection type :Shut down O/P voltage, recovers automatically after temperature goes down | | |
| FUNCTION | REMOTE ON/OFF CONTROL | Power ON : Short circuit Power OFF : Open circuit | | |
| | AUXILIARY POWER | 12V @ 0.5A tolerance ±10%, ripple=150mVp-p | | |
| | DC-OK SIGNAL | The TTL signal out, PSU turn on = 4.4 ~ 5.5V ; PSU turn off = -0.5 ~ 0.5V. Please refer to the Function Manual. | | |
| ENVIRONMENT | WORKING TEMP. | -40 ~ +70℃ (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20 ~ 95% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -40 ~ +80℃, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | ±0.03%/℃ (0 ~ 50℃) | | |
| | VIBRATION | 20 ~ 500Hz, 10G 12min./1cycle, period for 72min. each along X, Y, Z axes | | |
| SAFETY & EMC (Note.4) | SAFETY STANDARDS | UL62368-1,TUV EN62368-1, EAC TP TC 004 approved; design refer to EN61558-1, EN60335-1(by request) | | |
| | WITHSTAND VOLTAGE | I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.25KVAC | | |
| | ISOLATION RESISTANCE | I/P-O/P, I/P-FG,O/P-FG:100M Ohms/500VDC/25℃/ 70%RH | | |
| | EMC EMISSION | **Parameter** | **Standard** | **Test Level / Note** |
| | | Conducted | EN55032 (CISPR32) | Class B |
| | | Radiated | EN55032 (CISPR32) | Class A |
| | | Harmonic Current | EN61000-3-2 | Class A |
| | | Voltage Flicker | EN61000-3-3 | ----- |
| | EMC IMMUNITY | EN55024 , EN61000-6-2 | | |
| | | **Parameter** | **Standard** | **Test Level / Note** |
| | | ESD | EN61000-4-2 | Level 3, 8KV air ; Level 2, 4KV contact |
| | | Radiated | EN61000-4-3 | Level 3 |
| | | EFT / Burst | EN61000-4-4 | Level 3 |
| | | Surge | EN61000-6-2 | 2KV/Line-Line 4KV/Line-Earth |
| | | Conducted | EN61000-4-6 | Level 3 |
| | | Magnetic Field | EN61000-4-8 | Level 4 |
| | | Voltage Dips and Interruptions | EN61000-4-11 | >95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods |
| OTHERS | MTBF | 197.9K hrs min. Telcordia SR-332 (Bellcore) ; 52.32K hrs min. MIL-HDBK-217F (25℃) | | |
| | DIMENSION | 310*144*48.5mm (L*W*H) | | |
| | PACKING | 4Kg;4pcs/17Kg/1.04CUFT | | |
| NOTE | 1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.<br>2. This is Mean Well's suggested range. Please consult your battery manufacturer for their suggestions about maximum charging current limitation.<br>3. Derating may be needed under low input voltages. Please check the derating curve for more details.<br>4. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 720mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on http://www.meanwell.com)<br>5. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft).<br>※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx | | | |

## ■ BLOCK DIAGRAM

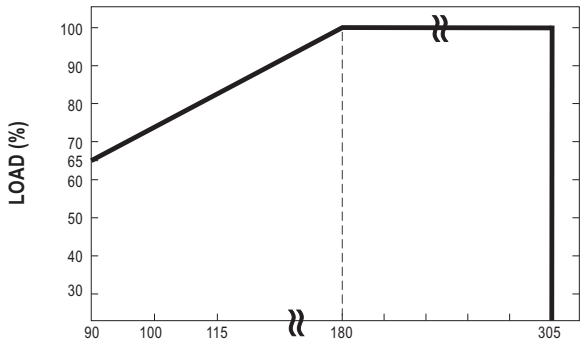



## ■ DERATING CURVE




**AMBIENT TEMPERATURE (℃)**

## ■ STATIC CHARACTERISTICS




**INPUT VOLTAGE (V) 60Hz**

※ For 100V model charging mode, output current is 20% rated min. when operating tempature at -40℃, and can reach 100% above -30℃.

## ■ FUNCTION MANUAL

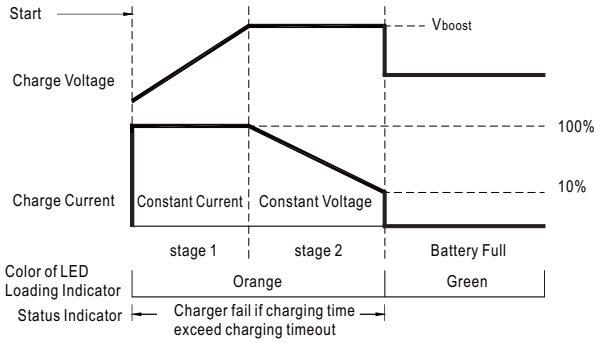
### 1.Charging Curve

※ By default, the HEP-1000 operates in power supply mode, and it can be configured to charger mode by PMBus, CANBus, or SBP-001.

※ By factory default, this charger performs the default curve which can be programmed via PMBus and CANBus.

※ To accommodate the parameters of the charging curve, SBP-001, the smart battery charging programmer designed by MEAN WELL, and a personal computer are needed. Please contact MEAN WELL for details.

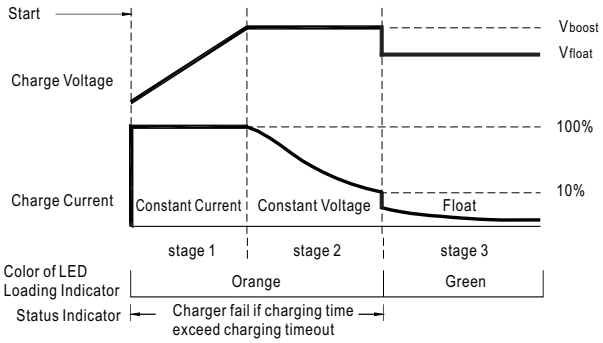
※ Default 2 stage charging curve




| State | HEP-1000-24 | HEP-1000-48 | HEP-1000-100 |
|---|---|---|---|
| Constant Current | 35A | 17.5A | 8.7A |
| Vboost | 28.8V | 57.6V | 115.2V |

◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

※ Default 3 stage charging curve




| State | HEP-1000-24 | HEP-1000-48 | HEP-1000-100 |
|---|---|---|---|
| Constant Current | 35A | 17.5A | 8.7A |
| Vboost | 28.8V | 57.6V | 115.2V |
| Vfloat | 27.6V | 55.2V | 110.4V |

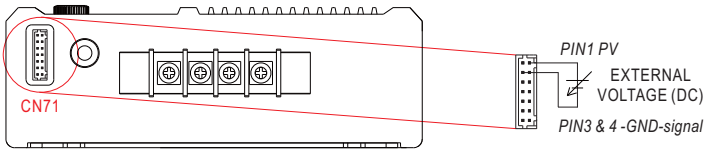
◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

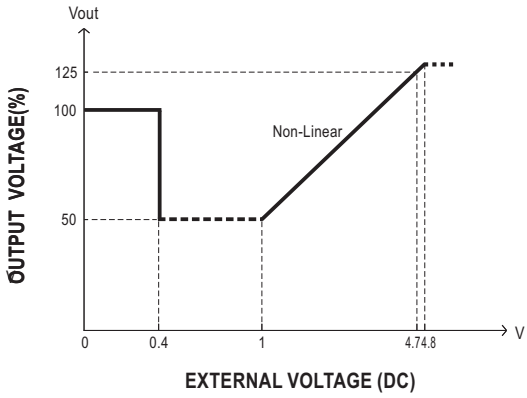
### 2. Front Panel LED Indicators & Corresponding Signal at Function Pins

| LED | Description |
|---|---|
| Green | Float (stage 3) |
| Orange | Charging (stage 1 or stage 2) |
| Red | Abnormal status (OTP, OLP, Charging timeout.) |
| Red (Flashing) | The LED will flash with the red light when the internal temperature reaches 95℃; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.) |

### 3.Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)

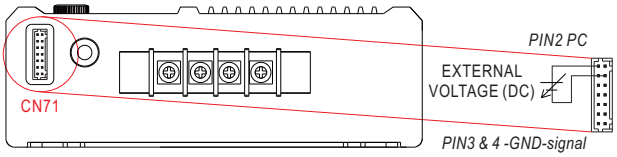
※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.

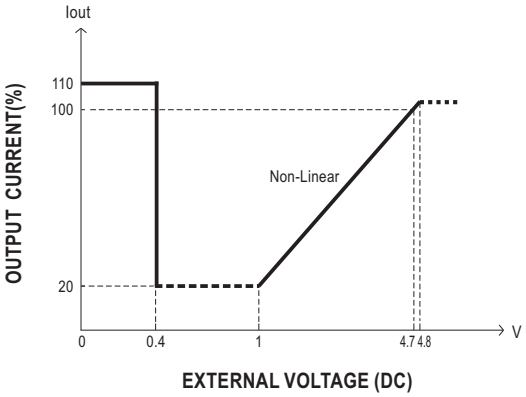


**4.Output Current Programming (or, PC / remote current programming / dynamic current trim)**

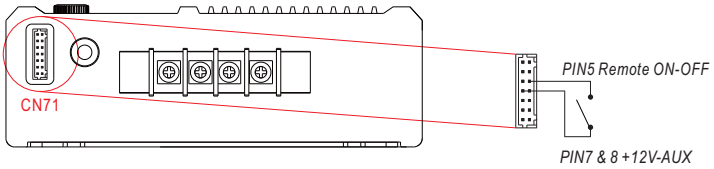
※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.




**5.Remote ON-OFF Control**

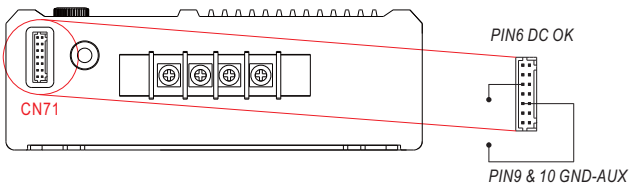
The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.




| Remote ON-OFF | Power Supply Status |
|---|---|
| Short circuit | ON |
| Open circuit | OFF |

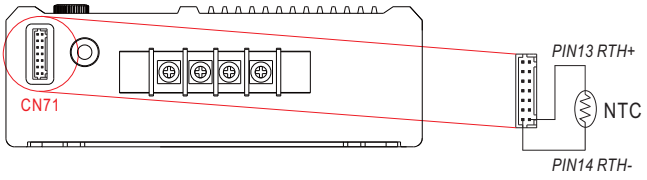
**6.DC-OK Signal**

DC-OK signal is a TTL level signal. The maximum source current is 10mA and the maximum external voltage is 5.5V.




| DC-OK signal | Power Supply Status |
|---|---|
| “High” >4.4~5.5V | ON |
| “Low” <-0.5~0.5V | OFF |

**7.Temperature Compensation**




◎ To exploit the temperature compensation function, please attach the temperature sensor, NTC, which is enclosed with the charger, to the battery or the battery's vicinity.

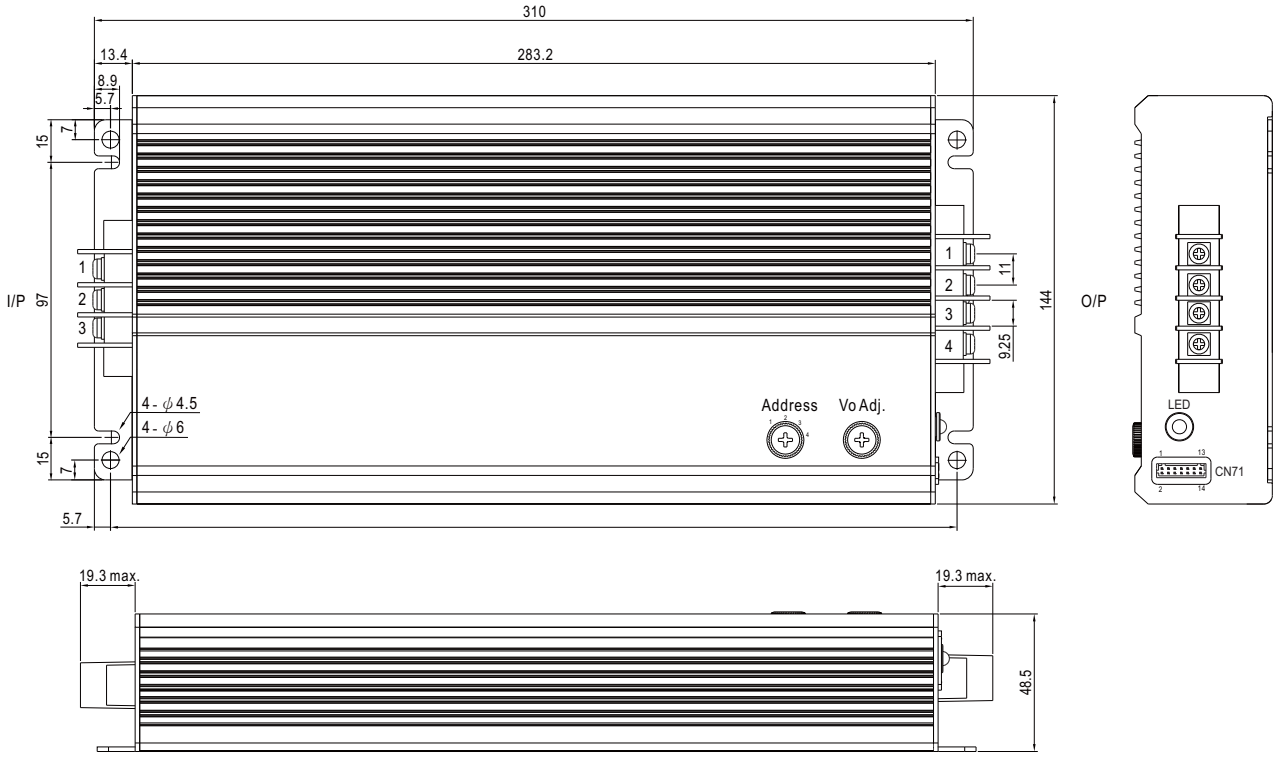
◎ The charger is able to work normally without the NTC.

**8.PMBus Communication Interface**

HEP-1000 supports PMBus Rev. 1.1 with maximum 100KHz bus speed, allowing information reading, status monitoring, output trimming, etc. For details, please refer to the User’s Manual.

## ■ MECHANICAL SPECIFICATION

Case No.228F Unit:mm




※ Output voltage current level can be adjusted through internal potentiometer.(Vo Adj.)
(Can access by removing the rubber stopper on the case.)
※ PMBus interface address selection.(Address)

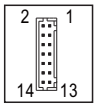
AC Input Terminal Pin No. Assignment

| Pin No. | Assignment |
|---|---|
| 1 | FG ⏚ |
| 2 | AC/L |
| 3 | AC/N |

DC Output Terminal Pin No. Assignment

| Pin No. | Assignment |
|---|---|
| 1,2 | -V |
| 3,4 | +V |

※Control Pin No. Assignment(CN71) : JST S14B-PHDKS-B or equivalent




| Mating Housing | JST PHDR-14VS or equivalent |
|---|---|
| Terminal | JST SPHD-001T-P0.5 or equivalent |

| Pin No. | Function | Description |
|---|---|---|
| 1 | PV | Connection for output voltage programming.(Note1) |
| 2 | PC | Connection for constant current level programming.(Note.1) |
| 3,4 | GND (Signal) | Negative output voltage signal. |
| 5 | Remote ON-OFF | The unit can turn the output ON/OFF by dry contact between Remote ON/OFF and +12-AUX.(Note.2)<br>Short (10.8 ~ 13.2V) : Power ON ; Open(0 ~ 0.5V) : Power OFF ; The maximum input voltage is 13.2V |
| 6 | DC-OK | Low (-0.5 ~ 0.5V) : When Vout≦77%±6% at power mode. Vout≦66%±6% at charger mode.<br>High (4.4 ~ 5.5V) : When Vout≧80%±6% at power mode. Vout≧67%±6% at charger mode.<br>The maximum sourcing current is 10mA and only for output.(Note.2) |
| 7,8 | +12V-AUX | Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX (pin9 & 10).<br>The maximum load current is 0.5A. This output is not controlled by "Remote ON-OFF". |
| 9,10 | GND-AUX | Auxiliary voltage output GND.<br>The signal return is isolated from the output terminals (+V & -V). |
| 11 | SDA | For PMBus model: Serial Data used in the PMBus interface. (Note.2) |
| | CANH | For CANBus model: Data line used in CANBus interface. (Note.2) |
| 12 | SCL | For PMBus model: Serial Clock used in the PMBus interface. (Note.2) |
| | CANL | For CANBus model: Data line used in CANBus interface. (Note.2) |
| 13 | RTH+ | Temperature sensor(NTC, 5KOhm) comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage. |
| 14 | RTH- | |

Note1: Non-isolated signal, referenced to [GND(signal)].
Note2: Isolated signal, referenced to GND-AUX.

## ■ INSTALLATION MANUAL

Please refer to : http://www.meanwell.com/manual.html